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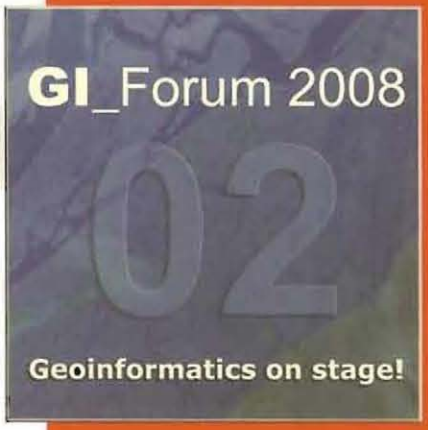

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Spatial Analysis for Conservation Status Assessment Within Natura 2000 Network in the Forest Area "Prado de Robledela" (Ávila, Spain)

The GI_Forum Program Committee accepted this contribution for participation in a Discussion Session.

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1 Introduction

The aim of the Directive 92/43/EEC (EEC, 1992), commonly known as Habitats Directive, "shall be to contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies" (Article 2). Because of it, it is necessary to ensure the pertinent measures which may help to evaluate the status conservation (Article 1.a) of the natural habitats included in Natura 2000 Network. To facilitate this work it is necessary to compile and process this information with GIS tools.

Objective of the study

- To establish a methodology of spatial analysis to evaluate the conservation status assessment of habitats included in Annex I of Habitats Directive.
- To provide an environmental evaluation of the study area.

2 Description of the study area

The study has been carried out in the forest space included in Natura 2000 Network, called "Prado de Robledela", in the region of Castilla y León in central Spain (Figure 1). This forest space, with 1418 ha, is included in Natura 2000 Network as a part of the Space of Community Interest (SCI) and Special Area for Birds Protection (SPA) called "Pinares del Bajo Alberche". There are 11 habitats listed in the Annex I of the Habitats Directive, four of them are listed as "priority habitats" (3170*, 6220*, 6230*, 9530*). A huge number of flora and fauna species (49) are also listed in the Annex II.

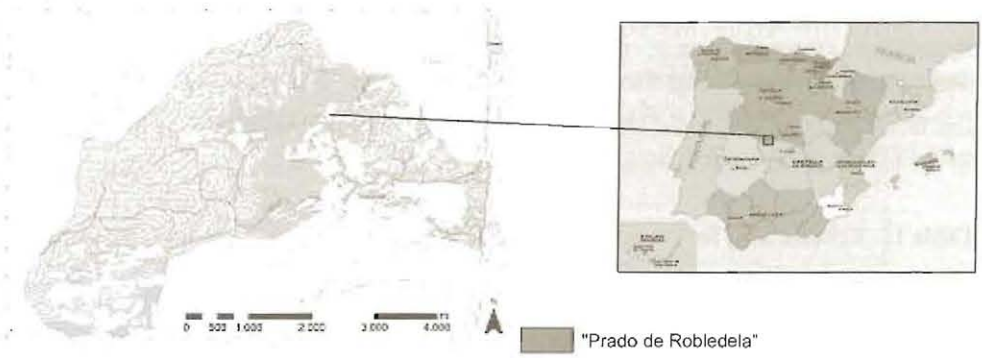

Fig. 1: Location of "Prado de Robledela" and topography of the space

3 Methodology

The first step of the methodology was the elaboration of habitats cartography by means of inventory field work, aerial photos interpretation and terrestrial mapping, using GIS (TEJERA GIMENO et al., 2007).

The following figure presents the general scheme for the methodology:

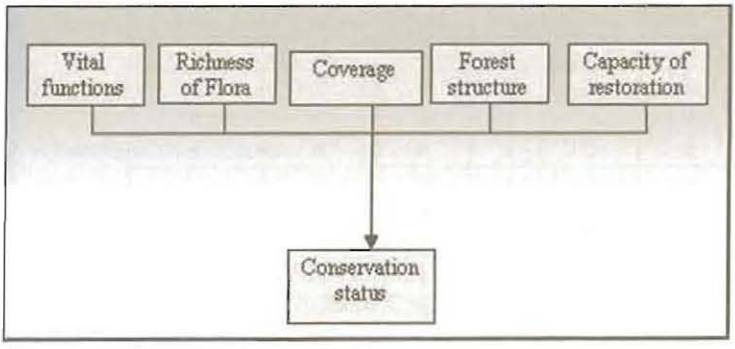

Fig. 2: Methodological scheme of conservation status assessment

Conservation status

The evaluation of "conservation status" of natural habitats is based on the "Natura 2000 Standard Data Form" for sites monitoring (EUROPEAN COMMISSION, 1995, 1996; ELLMAUER, 2005; SHAW & WIND, 1997). The conservation status is classified into three classes from "A" to "C" where "A" is an excellent status or most favourable, "B" is a good status and "C" is the least favourable. For this purpose these five factors are considered: vital functions, richness of flora, habitat coverage, forest structure and capacity of restoration.

The geomatics applications in ArcGIS 9.1, PCI, eCognition, and ENVI are used to analyse the local and regional coverage, to calculate areas and structure from vector and raster files (Instituto Nacional de Ecología).

The factors used to define the conservation status have been integrated into a doting-cross matrix (Table 1) using the following criteria.

Table 1: Criteria used for the integration of factors in the conservation status assessment

		Factor 1		
		A	**B**	**C**
Factor 2	**A**	A	A	B
	B	A	B	B
	C	B	B	C

Table 2: Conservation Status assessment

	Vital functions			Coverage				
Habitat code	Vitality	Health state	Richness of Flora	Regional area	Local area	Forest structure	Capacity of restoration	Conservation status
3170*	B	B	B	C	C	B	B	B
5120	B	B	B	C	C	B	B	B
6220*	B	B	B	A	B	B	B	B
6230*	B	B	B	B	B	B	C	B
6420	B	B	B	C	C	B	B	B
8130	B	B	B	C	C	B	B	B
8220	B	B	B	C	C	B	B	B
92A0	B	B	B	C	C	B	C	B
9340	B	B	C	B	C	B	C	B
9530*	C	C	C	C	C	C	C	C
9540	C	C	C	B	C	B	C	C

With these result it is possible to obtain a useful digital cartography that will provide the managers with an environmental diagnosis of the area.

4 Discussion and Outlook

The result of conservation status assessment is a good reflection of the situation observed in the study area "Prado de Robledela" during the inventory phases and the different tasks carried out under the management plan of this area. In fact, the unfavourable conservation status observed in previous field work in habitats 9530* and 9540 fits correctly with the value C obtained within the assessment (TEJERA GIMENO, 2007).

The methodology for the conservation status assessment is a very useful tool for Natura 2000 managers. It considers qualitative aspects of the territory that can be integrated in GIS. On the other hand, there are other methods focused on more quantitative indicators based on field work (BALTIC ENVIRONMENTAL FORUM, 2005; MÜLLER-KROEHLING, et al., 2004).

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GIS and Remote Sensing for Natura 2000 Monitoring in Mediterranean Biogeographic Region

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The GI_Forum Program Committee accepted this paper as reviewed full paper.

Summary

NATURA 2000 areas monitoring is a key research topic on European countries since Habitat Directive specifies the obligation to implement monitoring systems for conservation status in Natura 2000 spaces. This can be achieved by combining GIS-based models of the Potential Natural Vegetation (PNV) with remote sensing classification or interpretation results. The presented study focuses on the implementation of a methodology to locate and detect changes in forest spaces of Natura 2000 Network. Location of different habitats types were carried out based on geo-factors and remote sensing interpretation, terrestrial mapping and analysis of natural habitat distribution for a test site.

In order to derive the actual forest habitats, potential natural vegetation was derived from a defined rule-set, in which the habitat types with the highest possibility of occurrence could be ranked accordingly. The result of the modelling for potential natural vegetation was verified using available satellite data (LANDSAT TM). This task was carried with a maximum likelihood classification using the software PCI Geomatica. The results of the classification and the GIS analysis are combined to obtain preliminary habitat types. These types were verified with existing Forest Management Plans, and compared with results of local terrestrial mapping and natural distribution of habitat types.

Keywords: Potential Natural Vegetation, geo-factor, object-based classification, natural distribution.

1 Introduction

The monitoring of NATURA 2000 areas within the EU is still a challenging task. Recently, there are more precisely defined monitoring guidelines available on European level (European Commission, 2006). Therefore, it is not sufficient to assess and evaluate the conservation status of habitats and species only within the Special Areas of Conservation (SAC) of the NATURA 2000 network, but additionally on the biogeographical level. The EU defines biogeographic regions as a geographical framework for the establishment of a draft list of sites of Community importance from the membership states. This area-wide assessment is necessary because of possible small scale changes of the biodiversity network.